



A Study to Assess the Effect of Cholesterol Rich Diet on Sputum Status in Patients with Pulmonary Tuberculosis Admitted in a Selected Hospital of Mumbai

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ABSTRACT : Effect of cholesterol rich diet on sputum status in patients with pulmonary tuberculosis admitted in a selected hospital of Mumbai. Quasi experimental approach was used. Sample: patients diagnosed with tuberculosis with sputum positive status. Tool: Cholesterol rich diet, observation checklist and daily dietary inventory. Nineteen patients out of 30 from the sample group had sputum conversion from positive to negative within one month period. The critical ratio was calculated which was 5.54 which showed a significant difference between the percentages of study and control group. There was also improvement in the client's general wellbeing. The activity level of the clients was also improved a lot. The cholesterol rich diet though was not effective in improving the patients' hemoglobin levels, W.B.C count but it helped in early sputum conversion of the clients. The cholesterol which was supplemented to the clients did not raise clients' cholesterol levels above normal. Thus, it was concluded that cholesterol rich diet could help in early sputum conversion in clients with tuberculosis. The study guides the nurse to plan for such cholesterol rich dietary supplementation for the patients. Health education can be provided to nurses and patients about cholesterol rich dietary supplementation. This study also helps the nurses to know about importance in planning and providing nutrition.

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India and China record the highest number of TB cases globally, it said and added that, besides India, Bangladesh, Indonesia, Myanmar and Thailand are part of the high burden countries. The 11 countries included in the report are India, Bhutan, Bangladesh, Indonesia, Myanmar, Thailand, Maldives, Sri Lanka, Nepal, Timor-Leste, and North Korea. India and Indonesia alone contribute 40 per cent of the total cases

reported in the region. India's share is 22 per cent (McKenna *et al.*, 1995 and 1996).

According to Department of Infectious diseases, 'Malnutrition predisposes to tuberculosis, and tuberculosis causes 'consumption'. Tuberculosis has a dramatic effect on nutritional state and this has been borne out in all the studies that have investigated body composition in affected patients.

According to International Medicine 1979, there is evidence that man has suffered from tuberculosis for more than 5,000 years and through crowded living conditions, debilitation and malnutrition, tuberculosis became epidemic in Western civilization and was a major cause of mortality. Identification of the tubercle bacillus as the causative agent in 1882 firmly established the infectious nature of the disease and the development of sanatoriums soon followed. Next to the air you breathe and water you drink, food has been basic to your existence. In fact food has been the primary concern of man in his physical environment throughout all recorded history. By food or its lack, the destinies of men are greatly influenced. Man must eat to live, and what he eats will affect in high degree his ability to keep well, to work, to be happy and to live long.

Importance of diet in disease :

A primary purpose of the function of nutrition is, thus, to establish and to sustain the structure and function of all organs and parts of the body: to keep, in short, the mechanism of the body in perfect running order. And since health, at its best for it is a variable state of being is that condition of body in which all its organs and parts are sound and perform their functions easily, and satisfactorily, it follows that a primary purpose of the function of nutrition is to prevent, so far as its limitations permit, that disturbance or impairment of structure or function of organs or parts of the body which is diseased. (Guthrie *et al.*, 1996).

Resistance to infection may be greatly reduced by deficient diet. A deficiency in the diet of vitamin A or of vitamin C appears quite definitely to lower resistance to infection. In certain cases a lack of the vitamin B complex may also do same thing. A lack of vitamin D [per se] cannot have a proven effect in lowering resistance it occurs [such lowering is usually due to associated deficiency of vitamin A]. It seems probable that the existence of a partial deficiency [of vitamins] may result in loss of resistance to infection

Importance of food in health and disease :

A principal determinant of mortality from tuberculosis is nutrition. Mortality from T.B. increases considerably as one passes from the economically prosperous to the poor districts of any area. (Epidemic

and Crowd Diseases, 1925.) The rise in tuberculosis mortality was recorded in 1914-1916, and in those years the consumption of bread and flour rose, whereas that of meat decreased. After 1916 a steady and continuous fall in tuberculosis mortality, and at the same time flour foods fell off while the consumption of meat and fish rose rapidly. It may be added too, that in England, a rise in tuberculosis mortality coincided with a lower consumption of meat and butter and an increased consumption of flour foods. There has been a similar rise in tuberculosis mortality in practically all belligerent countries in Europe during and since World War II and for exactly similar reasons, namely, a great reduction in the consumption of protein foods, such as, meat, fish, and eggs, along with an increased consumption of the more available and cheaper starchy food stuffs.

Nurse's role in meeting the nutritional needs of the patients :

Fay Louise Bower emphasized importance of relation between nutrition and Nurse by saying, "both words nutrition and nurse are from the Latin root- 'Nutr' means 'nourishing'. Nurse meets physical, physiological and emotional needs of the individual. Hence, in order to meet the important basic needs of an individual, nutritional care is also considered as an integral part of the nursing practice. Nurses are in a unique position to assess the nutritional intake, give dietary teaching about low cost, readily available dietary supplements and thus, protect the patient from hospital induced malnutrition.

Florence Nightingale, the founder of modern nursing, said that nursing ought to signify the proper use of fresh air, light, warmth, cleanliness and quiet, proper selection and administration of diet- all at the least expensive of vital power to the patient. She included two chapters related to food in her Notes on Nursing. Thus, is quite evident how important a nurse is in meeting the nutritional needs of the patient.

RESEARCH METHODOLOGY

In this study, cholesterol rich diet means diet supplying 800 mg of cholesterol content per day which will include one boiled egg supplied for breakfast at 9 am and 2 eggs scrambled supplied during lunch at 12 pm.

Table A : Preparation of cholesterol rich diet						
Ingredients	Amount	Energy (Kcal)	Protein (g)	CHO (g)	Fat (g)	Cholesterol (Mg)
Boiled egg	One	80	6	Trace	5.8	252
Milk	(45ml)	30.15	1.44	1.98	1.84	15
Butter	(15ml)	109.35	nil	nil	12.15	30
Scrambled eggs	Two	160	12	trace	11.6	504
Total		379.5	19.44	1.98	31.39	801

This will include : Formula for preparing egg scrambled :

- 15 ml of melted butter will be spread in the coated nonstick frying pan.
- 2 eggs are broken in this hot pan on medium flame.
- 45 ml of milk will be added.
- The mixture will be stirred for 10 minutes till egg scrambled is ready.
- Pepper and salt 1g will be added for taste.
- This egg scrambled will provide 549 mg of cholesterol and 12 g of proteins.
- The total cholesterol provided will be 801 mg.

The cholesterol rich diet will be supplemented in two different forms to meet the requirement of 800 mg of cholesterol per day.

At 9 am the cholesterol requirement will be provided in the form of egg scrambled.

During the lunch time at 12.30 pm a boiled egg will be given to the clients which will provide 252 mg of cholesterol.

Above given diet was provided for 30 patients of the study group for 30 days. Meanwhile their blood tests were done for Hemoglobin, ESR, WBC, serum cholesterol, radiological status was also checked for the cavity status whether there was increase or decrease in size, microbiological status of the samples was checked for mycobacterium in the sputum, number of mycobacterium, nutritional status was assessed *i.e.* BMI, pallor, tolerance to supplement, Respiratory status: cough, sputum production and dyspnea was assessed. This all was observed pre intervention and post intervention.

Similar assessment was done for the control group. Another observation checklist was prepared to assess nutritional status, conjunctiva, nail bed, lips, vomiting, abdominal distension, diarrhea, flatulence, respiratory rate, cough, sputum production, colour, fever, This was

assessed for both the groups on day 1, day 8, day 16, day 24 and day 30.

A dietary inventory was prepared to assess the daily dietary intake: which included the whole day meal: early morning, breakfast, lunch, evening snacks, dinner for both the group for 30 days. The energy, protein, fat, carbohydrates, fats and cholesterol intake was calculated.

RESULTS AND DISCUSSION

The objectives of this study were:

- To calculate the daily caloric intake and cholesterol intake in study group and control group.
- To assess the physiological parameters before cholesterol rich diet in study group and control group.
- To prepare and provide cholesterol rich diet to the study group.
- To compare the physiological parameters after cholesterol rich diet in both study and control group.

As per the first objective of the study patients daily caloric intake was calculated which showed that the caloric intake of the clients in the study group was higher compared to that of the control group. This increase in caloric intake was due to the extra supplementation of cholesterol rich diet to the study group. Even though a high caloric intake was provided to the clients it was not sufficient for maintaining the patients in positive nitrogen balance. This shows that the clients with tuberculosis must receive extra supplementation of dietary calories from proteins and carbohydrates.

From the study, the investigator found that tuberculosis patients have significant reductions in body mass index. A study done on Nutritional assessment on 30 patients, aging 19-61 years, admitted to the Lister Unit of Northwick Park Hospital, Harrow, with active tuberculosis. Nutritional measurements were related to



the duration and extent of disease. Tuberculosis patients had significant reductions in body mass index (weight/height²) ($P = 0.001$). Chemotherapy was associated with progressive nutritional recovery and restoration of nutrition-related indices. However, mean arm muscle circumference and serum albumin levels of the patients remained subnormal at 12 months, suggesting that body protein reserves may not be fully repleted during treatment. Active tuberculosis is associated with profound protein-energy under nutrition which improves during treatment. This study shows that tuberculosis patients have significant reductions in body mass index because of which they require proper dietary intake to improve the immunity.

In this study the investigator found out that majority of the patients had nutritional deficit and below normal BMI. From this study it was evident that there was weight loss seen in patients after getting admitted with tuberculosis. The investigator found out that there was no significant increase in the weight of the patients post cholesterol rich dietary supplement. According to the investigator the clients may further require more nutritional supplement in order to improve their BMI. This finding is further supported by a study which was done to assess the randomized controlled trial of nutritional supplementation in patients with newly diagnosed tuberculosis and wasting.

The study showed that: Objective: To assess the effects of early nutritional intervention on lean mass and physical function in patients with tuberculosis and wasting. Design : Patients who started antituberculous therapy within the previous 2 wk were randomly assigned to receive standard nutritional counseling (control group) or nutritional counseling to increase their intake through diet and high-energy supplements (nutritional supplement group) for 6 wk. During subsequent follow-up, the increase in body weight remained greater in the nutritional supplement group, but this increase was due mainly to a greater gain in fat mass in the nutritional supplement group than in the control group. Conclusion: Early intervention to increase nutritional intake increases lean mass and physical function.

Joseph (2002) conducted a study using the descriptive evaluative approach “To study the effect of the supplementary diet on the nutritional status of children with PEM in urban slums of Malvani” 30 samples were selected. The study revealed that the supplementary diet brought about changes in the pallor, texture of hair, skin and improvement in the mouth conditions. The samples were found to be more active and took more interest in play. Thus, it was concluded that a supplementary diet rich in proteins and calories could be useful to treat children with PEM.

As per the third objective the study group clients were supplemented with 800 mg of cholesterol rich dietary supplementation daily for 30 days.

As per the fourth objective of the study, the effect of cholesterol rich diet was seen on the sputum status of the clients. There was significant reduction in the amount of sputum production, the frequency of cough, normalization of the respiratory status in the clients. Maximum number (19 out of 30 from study group) of samples had sputum conversion from positive to negative within one month period. There was also improvement in the client's general wellbeing. The activity level of the clients was also improved a lot. The clients had very few complaints regarding intolerance of the cholesterol rich diet.

The cholesterol rich diet though was not effective in improving the patients' hemoglobin levels, W.B.C count it helped in early sputum conversion of the clients. Proteins can help in early conversion of sputum of the clients which further will definitely help in reduction of infection as the patients will not be spreading infection to normal individuals. The cholesterol which was supplemented to the clients did not raise clients' cholesterol levels above normal. This could be due the utilization of cholesterol phagocytosis of mycobacteria in reducing their number in sputum in gain reducing infection. This result is supported by the study findings done in Mexico which showed that initially after 2 weeks there was an increase in serum cholesterol levels in the study group which plateaued later at the end of the study. There were no significant

Table 2 : Effect of the cholesterol rich dietary supplementation on the sputum conversion of the study group

Physiological parameters	%	P	Q	D %	CR
P ₁	100	68.5	31.5	11.37	5.54
P ₂	37				

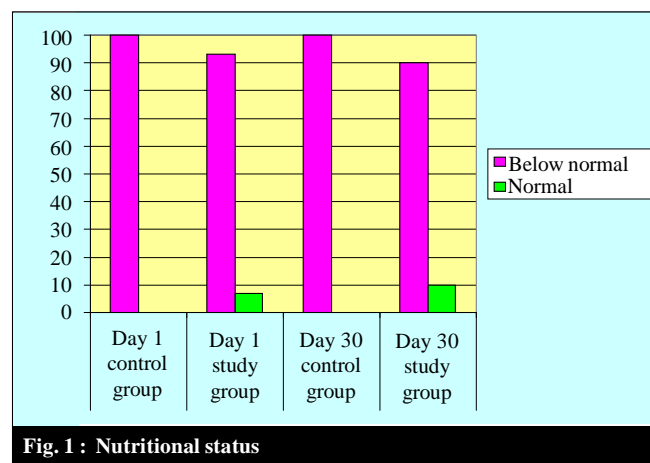
changes in the X ray readings as the x ray changes won't be so evident so early. It may require more time to notice changes in the x ray reports.

Significance of the effect of the cholesterol rich dietary supplementation on the sputum conversion of the study group :

It is evident from the Table 2 that critical ratio among the study group and control group per cent is 5.54 which is ≥ 2.58 . This signifies that the comparison of the percentage of sputum conversion within the study group and control group is a true difference and not by a chance. Hence, the Null hypothesis (H_0) is rejected and the research hypothesis (H_1) is accepted. Thus, the cholesterol rich dietary supplementation was effective in sputum conversion.

Thus, it was concluded that cholesterol rich diet could help in early sputum conversion in clients with tuberculosis.

The results of this study will lead to increased awareness of the importance of cholesterol rich diet among patients diagnosed with tuberculosis and will motivate others to try such supplementation to aid in speedy sputum conversion and speedy recovery of the patients.



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